REMARKS

Claims 1-20 are pending. The Office Action mailed December 1, 2004 has been received and its contents carefully reviewed. Applicants have amended the title of the application to more clearly describe the invention and distinguish the invention from the prior art. Applicants respectfully request reconsideration of this application in light of the following remarks.

A. 35 U.S.C. § 102 Rejections

Claims 1-3, 5-6, 13, 15-16, 17 and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,045,176 to Van Huisen (hereinafter "Van Huisen"). Applicants respectfully traverse the rejection.

Van Huisen is generally directed toward a system for generating steam and producing electricity therefrom in an economical configuration. Specifically, Van Huisen describes a downhole heat exchanger, which precludes the need to bring hot brine, which is extremely corrosive and erosive, from the geological formation to the surface. More particularly, Van Huisen sets forth a design configuration that utilizes a separate heat exchanger fed by many drilled wells that are both angled and geographically-confined at the surface to reduce plumbing expense. More specifically, Van Huisen describes a system of wells that reach typically 5,000 or more feet into the geological formation in order to contact thermally-active pockets where high temperature magma heats overlaying rock and water. The subject of Van Huisen is a method for heat transfer from the hot brine in these thermally-active pockets to the surface for the purpose of steam and electrical power generation. Since useful pockets of hot brine are geographically infrequent, the entire application of the Van Huisen approach is available only at select rare sites.

In contrast, the present invention is directed to a system of simple water wells for supplying a building heating, cooling and ventilation load, which is applicable to almost any terrestrial site. The water, which is generally cool, is simply withdrawn from an underground aquifer, sensible heat is removed or added by the building, and the same water is returned to the aquifer. No phase change occurs, as with the Van Huisen approach. Further, the typical depth of application of these water wells is not anticipated to extend beyond about 1000 feet or so. The present invention, then, is fairly universally available.

Additionally, in Van Huisen, steam is flashed from water in each of the return wells. The steam is collected in a heat exchanger mounted near or at the surface. Because of the high steam temperatures, Van Huisen particularly addresses the need to minimize heat loss at the heat exchanger and the need for all external piping that feed the power generation equipment. For this reason, Van Huisen recognized the need to bring the wells together at the surface for collection, thereby requiring the wells to be drilled on a slant to accommodate the number of wells required to meet a specified power rating.

The present invention instead uses a distributed geometry at the surface, in a configuration of headers and telescoping branch runs to feed and return hot and cool water to the individual wells. The system of water wells is preferably laid-out in a regular rectangular fashion with a suitable spacing to insure thermal segregation between wells. These wells are preferably drilled substantially vertically to reduce cost and insure maximum availability of qualified drillers.

Finally, in the present invention, field control of water well operation is designed to activate only those wells necessary to meet a given load. As the building load varies over the day, more or less wells are activated. For large tonnage systems, this control is done at the branch level, not the individual well level, as the latter would be too expensive. Thus, a branch is specified by the number of wells required to meet the building minimum load. The operation of the control strategy of the present invention is based on meeting a variable building load. Field control of branches is established according to an algorithm that seeks to maximize water well thermal relaxation (to maximize system availability) and minimize parasitics (by activating only those branches required to meet a given load). Van Huisen, by contrast, controls steam flow and pressure to affect electrical power generation.

Claim 1 of the present invention is directed to a geothermal system having a several geothermal wells, each geothermal well operating in cycles, and each cycle having a heat exchange phase followed by a thermal recovery phase, wherein the system operates at least one of the geothermal wells in a heat exchange phase while maintaining the remaining of the geothermal wells in a thermal recovery phase. Van Huisen makes no mention of operating its several geothermal wells in cycles, each cycle including a heat exchange phase and a thermal recovery phase. The present invention is specifically directed to a system that operates in cycles, in order to more efficiently use the geothermal heat available in an HVAC setting by keeping the well water generally at ambient ground temperature.

Also, independent claim 17 is directed to a similar geothermal system having several standing column wells, each standing column well being operated in cycles, and each cycle having a heat exchange phase followed by a thermal recovery phase, wherein each standing column well is switched from a heat exchange phase to a thermal recovery phase when a predetermined condition or conditions are met. Further, independent claim 19 is directed to a method for operating a geothermal system of several geothermal wells, including switching each geothermal well from a heat exchange phase to a thermal recovery phase when a predetermined condition or conditions are met, and switching each geothermal well from a thermal recovery phase to a heat exchange phase after the well has been in the former phase for a predetermined period of time, wherein the geothermal system sustains a heat exchange capacity of no less than a predetermined value.

Van Huisen utterly fails to teach or suggest the features discussed and the instant claims. On the contrary, Van Huisen merely describes a system of multiple geothermal wells. Van Huisen mentions a control system based on timing and implemented through the operation of individual well control valves. The control system is not defined, but the stated rationale for the control was to address thermal capacity of individual wells in the face of brine heating rate and convective heat transfer to the secondary water heat transfer fluid that boils and produces team. The control system of the present invention, as described in the independent claims 1, 17, and 19 demonstrates, through the cycles from a heat exchange phase to a thermal recovery phase, a control strategy that is perfected for water-rock heat transfer for typical water wells, not water-steam wells. Van Huisen fails to teach or suggest the specific details of the cycles from a heat exchange phase to a thermal recovery phase as they are used in independent claims 1, 17 and 19.

Since Van Huisen fails to teach or suggest each and every element recited in independent claims 1, 17 and 19, Applicant respectfully submits that the SESE article does not anticipate the present invention. Therefore, Applicants respectfully request that the rejection of independent claims 1, 17 and 19 under 35 U.S.C. § 102(b) be withdrawn. Similarly, with regard to claims 2-3, 5-6, 13, and 15-16, incorporating additional features, and dependent upon claim 1, 17 and 19, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 102(b) be withdrawn at least for the reasons set forth above with regard to independent claims 1, 17 and 19.

B. 35 U.S.C. § 103 Rejections

Also, claims 4-5, 7-12, 14, 18 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable for obviousness in view of U.S. Patent No. 4,045,176 to Van Huisen. Applicants respectfully traverse the rejection. The inadequacies of Van Huisen as an anticipatory reference have been set forth above in considerable detail, as well as Van Huisen's failure to render the claims of the instant invention obvious. Applicants respectfully submit that independent claims 1, 17, and 19 are patentable for the reasons set forth above and claims 2-16, 18 and 20, which depend from the independent claims, are also patentable over the art cited.

C. Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the outstanding rejections have been overcome and the case is now in condition for allowance. Applicants, accordingly, respectfully request that a timely Notice of Allowance be issued in this case.

Should the Examiner have any further suggestions or observations that would facilitate further prosecution or allowance of this case, the Examiner is invited to contact Applicants' representative designated below.

Respectfully submitted,

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